

LXX.—*Some Points in the Morphology and Classification of the Opiliones.* By R. I. POCOCK.

[Plates IX. & X.]

Part I.—THE CLASSIFICATION OF THE *PLAGIOTETHI*.

IN 1873 Sørensen (Nat. Tidskr. (3) viii. pp. 514-515) classified the Opilionides into two tribes—Opilionini for the typical genera, and Trogulini for *Ischyropsalis*, *Nemastoma*, *Dicranolasma*, *Trogulus*, and allied forms. From this classification it may be inferred that in the opinion of its author *Ischyropsalis* is more nearly related to *Nemastoma* and *Trogulus* than to the Phalangiine Opiliones, or Opilionini genuini as Sørensen called them. Subsequent authors have apparently been unable to divest themselves wholly of this view of the matter.

Three years later Thorell proposed the following classification (Ann. Mus. Genov. viii. pp. 462-469, 1876):—

Fam. I. PHALANGIOIDÆ.

Phalangium &c. and *Sclerosoma*.

Fam. II. NEMASTOMOIDÆ.

Subfam. 1. Nemastomini.

A.—a. *Ischyropsalis*.

b. *Nemastoma*.

B. *Dicranolasma*.

Subfam. 2. Trogulini.

Trogulus and *Anelasma*.

This classification, an expansion of Sørensen's, involves the supposition on Thorell's part that *Ischyropsalis* is more nearly related to *Trogulus* than to *Phalangium*, since the two forms are classified together in a group equal to the group containing *Phalangium* and its allies. The association, moreover, of *Ischyropsalis* with *Dicranolasma* in one subfamily, contrasted with another containing *Trogulus*, attests the belief that *Dicranolasma* is more nearly allied to *Ischyropsalis* than it is to *Trogulus*.

Both these conceptions are unquestionably erroneous.

Simon, in 1879 ('Arachnides de France,' vii.), in an excellent treatise on the Opiliones of France, with stray notes upon exotic forms, proposed the following taxonomy of the genera:—

Fam. PHALANGIIDÆ.

Subfam. 1. Sclerosomatinae.

Sclerosoma &c.

Subfam. 2. Phalangiinae.

Phalangium &c.

Fam. ISCHYROPSALIDÆ.

Ischyropsalis &c.

Fam. NEMASTOMATIDÆ.

Nemastoma.

Fam. TROGULIDÆ.

Subfam. Dicranolasmatinae.

Dicranolasma, *Amopaum*.

Subfam. Trogulinae.

Trogulus, *Anclasmoccephalus*.

This classification, which was followed in the main by Hansen (Nat. Tidskr. 1884), by Sørensen (Nat. Tidskr. 1884, Term. füzetek, xvii. 1894), Kraepelin (Mitth. Mus. Hamb. xiii. 1896), Becker (Arach. Belg.), and O. P. Cambridge (P. Dorset Field-Club, xi. 1890), is more in accord with the facts; but I do not think the arrangement of the genera into four equivalent sections fully expresses their true relationships. Moreover, in the key to the determination of these families, they are grouped under two primary headings, the first containing the Phalangiidae, and the second the Ischyropsalidae, Nemastomatidae, and Trogulidae, a method which suggests a covert adherence to the views of affinity originally promulgated by Sørensen.

That the Palpatores or Plagiostethous Opiliones fall into the four families instituted by Simon is thus generally admitted, but that these families are naturally groupable into the two sections which are also usually adopted is, I am persuaded, an erroneous view. They fall into two groups, it is true, but the line of division comes, not between the Phalangiidae and Ischyropsalidae, but between the Ischyropsalidae and Nemastomidae, *Ischyropsalis* being far more nearly related to *Phalangium* than to *Nemastoma*.

This proposition, so contrary to what is usually accepted, may be easily justified.

The sternal surface of the prosoma in the Phalangiidae is furnished with a relatively large, usually longitudinally oblong, anterior plate or *labium*, which underlies and is partially united to the maxillary processes of the legs of the first pair. Behind, with its free anterior edge overlapping the posterior border of the labium, lies a second sternal plate, which is shorter and wider than the first, with its long

axis transverse and its posterior border straight or nearly so. Jutting inwards on each side from the proximal end of the coxa of the second leg is a movable maxillary sclerite, which underlies and supports the labium, and the proximal end of the coxa of the fourth leg projects forwards on the admedian side of that of the preceding coxa, partially excluding it from approaching the middle line of the sternal area. (Pl. IX. fig. 1 A.)

In the structure of its two sternal plates *Ischyropsalis* resembles the Phalangiidæ, as also in the forward prolongation of the proximal end of the coxa of the last leg. The chief difference between the two, so far as the structures in question are concerned, lies in the fact that the maxillary process of the coxa of the second leg is shorter and directed vertically downwards*. (Pl. IX. fig. 1 B.)

In *Nemastoma*, *Dicranolasma*, *Trogulus*, and *Metopoctea*, on the contrary, the labium is small, cordate or piriform, or almost suppressed, and is lodged between the maxillary processes of the legs of the first pair; its posterior border is continuous with and flexibly fixed to the anterior end of the sternum, and the sternum itself lies longitudinally, immovably wedged between the coxæ, narrowed in front between those of the first pair of legs and expanding posteriorly into a triangular plate or a right and left branch, forming a Λ -shaped sclerite. Moreover, there is no maxillary process on the coxa of the second pair of legs, and the coxa of the fourth leg does not send forward a process on the proximal side of that of the third leg. (Pl. IX. figs. 2, 3 A, and Pl. X. fig. 3 B.)

I have been able to examine the sternum only in the genera mentioned above. No doubt, however, a similar arrangement will be found in the other genera of Trogulidæ †.

There is, then, a radical difference between the sternal sclerites of the Phalangiidæ and Ischyropsalidæ on the one hand, and of the Nemastomidæ and Trogulidæ on the other,

* As characters serving to distinguish *Ischyropsalis* from the Phalangiidæ the fixity and smallness of the maxillary lobe of the second pair of legs and the immobility of the coxæ of the legs have often been urged. But neither the maxillary process nor the coxæ are fixed; they are movable, as may be easily demonstrated by holding a specimen of *Ischyropsalis* under the microscope and manipulating the parts in question with a needle. They are not so movable as in the Phalangiidæ certainly, but equally certainly the coxæ are not fixed, as are those of *Gonyleptes* or *Trogulus*, nor is the maxillary process fixed in the sense that the ocular tubercle is fixed.

† In his diagnosis of *Amopaum* Simon, in 1879, says "*pièce labiale plane et large*"; yet Sörensen, in 1884, enumerates amongst the characters distinctive of the Nemastomoidæ and Troguloïdæ, including *Amopaum*, "*labium sternale minutum*." I am unable to reconcile these statements.

enabling us to classify these four families into two groups. These I propose to call Apagosterni and Eupagosterni*.

In none of the systematic works quoted above have I found the sterna of the Nemastomidæ and Troglidæ described.

In speaking of the sternum of the Opiliones in general, Simon confined his remarks, so far as the Plagiostethi (Palpatores) are concerned, to the Phalangiidæ (*loc. cit.* p. 121). Had he examined the sternum in *Trogulus*, *Nemastoma*, and *Dicrauolasma*, he would hardly have described this plate as "très-court, transverse" (p. 157) in the Plagiostethi. In short, his account of the Plagiostethi contains no statement of the structural differences pointed out above.

Thorell, on the other hand, appears to have searched for the sternum at least in *Trogulus*, but with what measure of success may be gathered from his statement that in this genus two small oblique laminae, meeting at an angle in front and united to the base of the coxæ of the first pair of legs, seem to take the place of the sternum and labium (p. 468, 1876). These "oblique laminae" are the thickened and elevated edges of the coxæ in question.

In the present year (Zool. Anz. xxv. p. 445) Börner writes:—"Auch bei *Trogulus tricarinatus* fand ich keine Unterlippe, aber ebenfalls kein eigentliches Sternum; die Chitinhaut zwischen den Hüften der 4 letzten Beinpaare ist nur schwach und gleichmässig chitinisiert und kaum als Sternum aufzufassen; hier schliessen die Coxalfortsätze der 3 Extremität den Mund hinten ab. Bei *Nemastoma* findet man ein kleines Sternum zwischen den Hüften der 3 Extremität, hinter den Coxalfortsätzen; es ist ohne labiale Function, die von den Kauladen der 3 Extremität ausgeübt wird; andere sterna fehlen hier. . . . Da der Genitaldeckel . . . zwischen den Hüften . . . des letzten Beinpaare (*Trogulus*, *Nemastoma*, Phalangidæ etc.) liegt . . . fehlen bei den Opiliones meist das Tetra-, Penta- . . . und Metasternum" [=sternal plates of the somites of the prosoma]. And in the table (p. 439) showing the persistence and suppression of the sternal plates in various genera of Arachnida the sterna of the third and fourth somites [*i. e.*, represented by the first and second pairs of legs] in *Trogulus* are bracketed as "schwach chitinisiert," those of the fifth and sixth as replaced by the genital plate; in *Nemastoma* that of the third [*i. e.*, the *labium*] is indicated as present, those of the fourth, fifth, and sixth bracketed as replaced by the genital plate.

* ἀπαγής, loosely knit or unfixed; ἐνπαγής, well fixed or firmly knit; and στέρον, the breast.

I cannot agree with this interpretation of the facts. It appears to me that in all Opiliones, including the Anepignathi (*Leptopsalis* &c.), the sternal sclerite that lies behind the labium represents the sternal elements of the posterior four somites of the prosoma, and is strictly homologous throughout the order.

In addition to the features mentioned above, *Ischyropsalis* differs from *Nemastoma* and the Troguloid genera, and resembles the Phalangiinæ, in the separation of the carapace from the tergites of the opisthosoma, the presence of a deep transverse groove on the posterior portion of this plate, the exposure of the apertures of Krohn's glands, the suppression of the anal sternite, the absence of lateral anal valves, and the dentition of the digits of the chelicerae. The large size of the chelicerae even is a character shared by such genera of Phalangiinæ as *Rhampsinitus* and *Pantopsalis*. Added to all these features is the presence of a movable styliform process at the extremity of the penis—a character which Simon pointed out as distinctive of the Phalangiidæ, although he was not able to test the supposed absence of this structure in *Ischyropsalis*. In fact, in almost all its characters, except the shortness of the terminal segment of the palpus, the suppression of the palpal claw, the absence of tibial spiracles, and the direction of the maxillary process of the second pair of legs, *Ischyropsalis* is essentially Phalangiine in structure. These four characters justify the formation of a separate family for *Ischyropsalis* and its allied form *Sabacon*, which is unknown to me; but when balanced in the scale against the many deep-seated characteristics separating this family from the Nemastomidæ, its next of kin amongst the Eupagosternous genera, they have but little weight.

One other small point connected with the affinities of *Dicranolasma* remains to be mentioned. This genus was placed nearer to *Nemastoma* than to *Trogulus* by Thorell and nearer to *Trogulus* than to *Nemastoma* by Simon. So far as the facts dealt with by the two authors were concerned, Thorell's view appears to me to be the more correct; of the two, Simon relied solely upon the presence of the frontal processes in classing the genus with *Trogulus*, whereas in the structure of the appendages, of the sternites of the opisthosoma, and of the last two tergites the affinities are very decidedly more Nemastomine than Troguline. The sternal plates of the prosoma are, however, more like those of *Trogulus* than of *Nemastoma*. Perhaps, therefore, the most satisfactory method of dealing with *Dicranolasma* is to regard it as the type of a special family.

The Palpatores or Plagiostethous Opiliones may be classified then as follows :—

- a. Anteriorsternal plate (*labium*) small, wedged in between the sterno-coxal or maxillary processes of the appendages of the third pair (first pair of legs); posterior sternal plate with its long axis longitudinal, narrow in front, where it lies between the coxæ of the appendages of the third pair, expanding posteriorly and sending out a right and left process, against which the coxæ of the fifth and sixth appendages (third and fourth legs) abut, its posterior border being strongly or moderately emarginate; the proximal end of the coxæ of the sixth appendage narrowed and not overlapping that of the fifth towards the middle line; coxa of the fourth appendage without a movable sterno-coxal process. Dentition of digits of chelicerae evenly serrulate. Penis of male without movable terminal sclerite beyond the orifice (sec. Simon) Eupagosterni.
- a¹. Sternites of opisthosoma free, overlapping, without median divisional sulcus; first and second (genital and tracheal) narrowed anteriorly and conically produced between the coxæ of the prosoma, and only overlapping the posterior two pairs to a relatively small extent; eighth or penultimate tergite large, greatly expanded laterally, the ninth or anal considerably larger than the anal sternite and than the lateral anal valves; labrum elevated, subacute; legs longish, with protarsi distally slender, not wider than the tarsi, which are multiarticulated.
- a². Ocular tubercle normal, bearing the two eyes and situated a little distance behind the anterior border of the carapace; sternum thickly chitinized, inversely Y-shaped Fam. NEMASTOMIDÆ.
- b². Ocular tubercle absent, its place taken by a pair of horizontally arched frontal processes, bearing the eyes near the middle of their length and overhanging the chelicerae; sternum less strongly chitinized, very narrow in front, broadly triangular behind Fam. DICRANOLASMIIDÆ.
- b¹. Sternites of opisthosoma, except the genital and anal, fused, not overlapping, and marked by a median longitudinal sulcus; first and second (genital and tracheal) widely rounded anteriorly and

considerably overlapping the proximal extremities of the two posterior pairs of coxæ; eighth or penultimate tergite small and narrow, not expanded laterally; the ninth or anal subequal in size to the anal sternite and lateral valves; labrum flat; legs shorter and stouter, with protarsi distally broader than the tarsi, which are pauciarticulated; carapace with frontal processes concealing the appendages of the first two pairs; sternum as in *Dicranolasma*, but with the posterior expanded portion shorter and wider

Fam. TROGULIDÆ.

- b. Anterior sternal plate (*labium*) large, subquadrate, as long as or longer than the posterior sternal plate and underlying the sterno-coxal or maxillary processes of the appendages of the third pair (first pair of legs); posterior sternal plate with its long axis transverse, at least twice as wide as long, its posterior border straight, not emarginate; proximal end of the coxæ of the sixth appendages sending forwards a process on the proximal or inner side of those of the preceding appendages; coxæ of fourth pair (second leg) with distinct and movable sterno-coxal (maxillary) process. Dentition of digits of chelicerae uneven, lobate. Penis of male with movable terminal style

Apagosterni.

- a³. Terminal segment of palpus shorter than the penultimate and clawless; postero-inferior edge of the coxæ of the appendages of the last pair not fused with the adjacent sternal plate of the opisthosoma; maxillary process of second leg directed vertically downwards; no tibial spiracles

Fam. ISCHYROPSALIDÆ.

- b³. Terminal segment of palpus much longer than the penultimate and armed with a small claw; coxa of sixth appendage united near its base on the posterior side to the tracheal sternite of the opisthosoma; maxillary process of second leg directed horizontally inwards; tibial spiracles present

Fam. PHALANGIDÆ.

- a⁴. Carapace not fused with the anterior five tergites of the opisthosoma; apertures of Krohn's glands exposed .

Subfam. *Phalangiinae*.

- b⁴. Carapace and anterior five tergites of opisthosoma fused into a single dorsal shield; apertures of Krohn's glands concealed

Subfam. *Sclerosominae*.

Part II.—THE POSITION AND CLASSIFICATION OF THE
INSIDIATORES.

Up to 1900 there was a tacitly admitted or openly expressed agreement that the Opiliones, apart from the Anepignathi or Cyphophthalmi, fall into two nicely balanced groups—the Palpatores or Plagiostethi and the Laniatores or Mecostethi. In the year named this arrangement was disturbed by Dr. J. C. C. Loman (*Zool. Jahrb., Syst.* xiii. p. 80), who proposed the suborder Insidiatores for the family Triænonychidæ of Sørensen—a family resembling the Laniatores in all essential characters except the presence of a single claw on the tarsi of the fifth and sixth pairs of appendages, as in the Palpatores. The characters in which the Palpatores differ from the Laniatores are numerous and have been pointed out by Thorell, Simon, and especially Sørensen. In Loman's opinion the systematic value assignable to the claws is equal to that of all the other structural characters combined. In the present year (*Zool. Jahrb.* xvi. pp. 170–171) he tabulates the characters of the three suborders, and adds to his earlier diagnosis of the Insidiatores two additional features in which they resemble the Palpatores and differ from the Laniatores—namely, the presence of two receptacula seminis in the female and of an erectile muscle for the glans of the penis in the male. Judging, however, from his tabulation of the characters, the Insidiatores are at one with the Laniatores in the segmentation of the opisthosoma, the structure of the palpi, of the coxæ of the appendages, and of the sternum of the prosoma, in the wide distance between the mouth and genital orifice, in the number of the saccular diverticula of the alimentary canal, the structure of the lubricating-glands of the penis, and the structure of the ovipositor.

It appears to me that a greater value must be assigned to these many points of resemblance than to the three points of difference above alluded to, and that the Triænonychidæ or Insidiatores must still be classified with the Laniatores in a group equivalent to the Palpatores. Nevertheless it is evident that they differ from the remaining families of Laniatores in characters of greater importance than those used to distinguish these said families from each other. Hence it is perhaps advisable to accept the Insidiatores as a group equivalent to the Laniatores, and to classify them together under the Mecostethi. I propose therefore the following classification of the Opiliones:—

A. PLAGIOTETHI (=Palpatores).

- a. Apagosterni.
- b. Eupagosterni.

B. MECOSTETHI.

- a. Insidiatores.
- b. Laniatores.

C. CYPHOPHTHALMI (= Anepignathi *).

The characters separating the Apagosterni and Eupagosterni, however, are of much higher value, in my opinion, than those separating the Insidiatores and Laniatores. The sternal plate of the prosoma in the Laniatores shows great constancy in shape as compared with that of the Insidiatores. The Laniatores are divided into several families, in all of which the sternum exhibits but little variation from the normal characteristic of the Mecostethi. It seems logical, therefore, to conclude that when striking variations from this type are met with in the Insidiatores, such variations, if constant, should form the basis for the establishment of groups of "family" rank. I propose consequently to divide the Insidiatores, which by Sørensen and Loman are considered to be represented by the single family Triænonychidæ, into the following groups of this rank, postulating that the structural features on which they rest have at least the same value as those used for the same purpose in the Laniatores :—

- a. Sternum very narrow and compressed between the coxæ of the appendages of the fifth pair, abruptly expanding between those of the sixth, and showing a lanceolate or narrowly cordate expansion opposite the line of junction of the coxæ of the fourth and fifth pairs of appendages.
 - a¹. Posterior expansion of sternum narrow, subpentagonal, not wider than long, much narrower than the length of the area between the fifth appendages; stigmata exposed Fam. TRIÆNONYCHIDÆ.
 - b¹. Posterior expansion of sternum transversely arcuate, laterally pointed, much wider than long, much wider than the length of the narrow area lying between the coxæ of the fifth appendages; stigmata concealed Fam. TRIÆNOBUNIDÆ, nov.

* This name is of later date than *Cyphophthalmi*, and was based upon a misconception.

- b. Sternum not narrow and compressed between the coxæ of the fifth appendages, wider at this point than in front, either narrowly triangular and gradually expanding from before backwards between the coxæ of the fifth appendages or narrowly pentagonal and somewhat abruptly expanding between them; stigmata concealed Fam. ADÆIDÆ, nov.

The Insidiatores are confined to the southern portion of the Great Continents. The Triænonychidæ contain the genera *Acumontia* from Madagascar; *Diasia* from Chili; *Triænonyx* from Chili, New Zealand, Australia, and Fiji; *Nuncia*, which is hardly separable generically from *Triænonyx*, from New Zealand; and two new genera to be shortly described, one from New Zealand, the other from Tasmania.

The characters of the Triænobunidæ are taken from a specimen belonging to a Tasmanian species in the British Museum which I refer to *Triænobunus*. The type of the latter was from Queensland.

The Adæidæ are represented by two genera. *Adæum*, of which the British Museum has examples, is confined to S. Africa and New Zealand.

The genus *Larifuga*, to which belongs *P. rugosum*, Guér., of which the type is in the British Museum, is also S. African.

Part III.—FURTHER NOTES ON THE STERNA AND ON THE SEGMENTATION OF THE ABDOMEN.

In the paper already quoted Börner states that, on account of the forward projection of the genital plate between the coxæ of the appendages of the sixth pair in *Leptopsalis* and *Pachylus* and the encroachment of the coxæ of the fourth and fifth pairs towards the middle line in the members of the group—the Mecostethi—to which *Pachylus* belongs, the sternites of the fourth, fifth, and sixth somites of the prosoma are mostly wanting in these groups, although in *Leptopsalis* amongst the Anepignathi or Cyphophthalmi that of the fifth persists; and in the table, also cited above, the sterna of the fourth and fifth somites are indicated as absent in *Pachylus* and that of the sixth as replaced by the genital plate.

It is difficult to reconcile this opinion with the known facts. In the Mecostethi (including *Pachylus*) the sternal plates of the fourth, fifth, and sixth somites of the prosoma are represented by a firmly chitinized, narrow, unsegmented, longitudinal plate lying between the coxæ of the fourth and fifth

pairs of appendages and abutting against the inner angles of those of the sixth in front of the generative orifice, where it is slightly (*Gonyleptes*) or considerably (*Adæum*) expanded*. This expanded portion is overlapped by the genital plate, and frequently the maxillary processes of the fourth pair overlies its anterior portion in the middle line (*Oncopodidæ*, *Triænonychidæ*, *Biantidæ*, &c.), although it is uncovered in the *Gonyleptidæ* and *Cosmetidæ*.

Börner has also, I think, misinterpreted the sterna of the opisthosoma in *Trogulus*. The large plate following the genital operculum is numbered 4 and the following plate 5 (fig. 11, p. 443), and it is to be inferred that these plates correspond to those numbered 4 and 5 in the figures of *Leptopsalis* and *Pachylus*, the fourth being that which bears the stigmata and the fifth the next following. But in *Pachylus* and, I believe, all Laniatores and most Palpatores, except some Phalangiidæ (e. g., *Sclerosoma*), the sterna Börner has designated 4 and 5 in the case of *Pachylus* are united to form a single plate, the line of demarcation being represented by a shallower or deeper groove or scarcely at all traceable. In *Trogulus* the divisional line is, I think, quite obliterated. If so, the sternal plate marked 4 by Börner for this genus should have been marked 4+5 to bring it into harmony with those of *Pachylus*, and the sternum marked 5 should be 6. This method of enumeration arrives at numerical similarity in the sternal plates in the two genera, instead of leaving *Trogulus* with one plate short. *Trogulus* is an exceedingly specialized genus, and the key to its morphology is to be found in its less specialized allies *Dicranolasma* and *Nemastoma*. Both these genera have the same number of sternal plates as *Pachylus*, namely, seven, including the genital and the anal, and the second is marked by a transverse impression, as in *Pachylus* and many other genera of Laniatores, indicating its primitive double origin. I think there can be no reason to doubt that this transversely impressed second plate in *Dicranolasma* is the homologue of the unimpressed second plate in *Trogulus*.

In the Laniatores and Palpatores eight sternal plates are to be traced with certainty. The first is the genital, the second the tracheal, and the eighth the anal. In all Lania-

* In the article "Arachnida" in the supplementary issue of the *Encycl. Britannica*, p. 544 (1902), under the heading Laniatores the insertion of the words "of the fifth pair" was an error which was overlooked in the correction of the proof. Also under the family Cryptostemmidæ (p. 543), for *Anthracomartus* read *Poliochera*.

tores the second and third are fused, though the line between the two is very deep and strong in some forms (e. g., *Biantes*).

In the Eupagosternous Palpatores the divisional line between the second and third is feebly (*Dicranolasma*) or not at all (*Trogulus*) marked, and the eighth is small.

In all the Apagosternous Palpatores, except *Taracus* belonging to the Ischyropsalidæ, the eighth is suppressed, the anal tergite closing against the posterior border of the seventh. Similarly in all the members of this group the first or genital is not or scarcely differentiated from the second, and only in some cases (e. g., *Sclerosoma*) is there a deep groove between the second and third. Hence in the Phalangioid Palpatores the number of sternites may be reduced to six, (1) by the suppression of the eighth (anal) and fusion of the first (genital) with the second (tracheal) in *Sclerosoma*; (2) by the fusion of the first, second, and third into a single plate in *Taracus*, or even to five by the fusion of the first, second, and third, and the suppression of the eighth, as in most Phalangiinæ.

Finally, in many genera of Laniatores the eighth shows indications of being composed of two sternites, which would bring the total number of sternites up to nine, thus equalling the tergites in number and agreeing precisely with the number of sternites found in the young of *Pettalus* and the adults of the species of *Stylocellus* (*Leptopsalis*) amongst the Anepignathi (Cyphophthalmi), the third suborder into which the existing Opiliones fall, and also with the numbers found in the genera of the Carboniferous Anthracomarti, as I have recently shown (Geol. Mag. 1902, Oct. and Nov.).

EXPLANATION OF PLATES IX. & X.

- Fig. 1.* The ventral surface of the prosoma of a species of *Gagrella* (1 A), one of the Phalangiidæ, and of *Ischyropsalis* (1 B), one of the Ischyropsalidæ, with the genital prolongation of the opisthosoma removed, to illustrate the structure of the sternal plates &c. in the Apagosterni. II-VI, basal segments of the appendages from the second to the sixth pairs; *mx. 2, mx. 3, mx. 4*, maxillary processes of the second, third, and fourth appendages; *st. 1*, anterior sternal plate or labium; *st. 2*, posterior sternal plate, the so-called sternum proper; *mb.*, membrane forming the roof of the genital canal, representing, perhaps, the sternal area of the genital somite.
- Fig. 2.* Ventral surface of the prosoma of a species of *Nemastoma*, one of the Eupagosterni, with the genital prolongation of the opisthosoma removed. I-VI, basal segments of the appendages; *tr.*, labrum; *mx. 2, mx. 3*, maxillary processes of second and third pairs of appendages; *st.*, sternal plate attached anteriorly to the piriform labium; *mb.*, membrane forming the roof of the genital canal, and representing, perhaps, the sternal area of the genital somite.

- Fig. 3.* Ventral surface of the prosoma of a species of *Dicranolasma* (3 A) and of *Trogulus* (3 B), two of the Eupagosterni, with the genital prolongation of the opisthosoma removed. The lettering as in fig. 2. (For the sake of clearness the distinctness of the labium in these figures is exaggerated.)
- Fig. 4.* Median portion of ventral surface of prosoma of a species of *Adæum* (A) and of *Triænobunus* (B), with the genital plate of the opisthosoma removed. III-VI, coxæ of the third to the sixth appendages; *lb.*, labial portion of sternum; *mr. 3*, *mr. 4*, maxillary processes of third and fourth pairs of appendages; *st.*, sternum overlapped in front by the coxæ of the fourth appendage on each side; *mb.*, membrane in front of the genital orifice (*g*), representing, perhaps, the sternal area of the genital somite. C. Sternum of *Larifuga* (after Loman).
- Fig. 5.* Median portion of ventral surface of prosoma of a species of *Acumontia* (A), one of the Triænonychide, and of a species of Gonyleptidæ (B). Lettering as in fig. 4.

LXXI.—On the Mole of the Roman District.

By OLDFIELD THOMAS.

THE British Museum owes to the kindness of Dr. L. Sambon two moles obtained by him during the important malaria experiments carried out by him during the summer of 1900.

An examination of the skulls of these specimens shows that they differ widely both from the common European mole (*Talpa europæa*) and Savi's mole (*Talpa cæca*) by the very much greater size of their teeth and certain other cranial characters, and are clearly separable specifically. *Talpa cæca* has, if anything, even smaller teeth than *T. europæa*.

Talpa romana, sp. n.

Colour and proportions about as in *T. europæa*; orbits apparently covered by skin, but this is not absolutely determinable.

Skull of about the same length as that of *T. europæa*, but somewhat more heavily built; zygomata thicker and perceptibly longer, their hinder end starting from the brain-case nearer its external angles and nearly or quite above the anterior part of the meatus instead of wholly in front of it; lacrymal foramina markedly larger than usual.

Teeth, and especially molars, conspicuously larger throughout; upper incisors broad, closely touching one another, the median pair larger in proportion to the others than in the common mole; molars much larger and heavier in every direction, broader, with larger internal lobes, higher and longer than in any other European form. The combined length of